What is claimed is:

1. A chemical liquid processing apparatus for processing a substrate using chemical liquid, comprising:

a substrate holding portion for holding a substrate;

a chemical liquid spouting nozzle disposed on said substrate holding portion for supplying chemical liquid onto a substrate held by said substrate holding portion so as to form chemical liquid film on the substrate; and

a gas supply portion for forming air flow which contacts with the surface of said chemical liquid film so as to form a flow of chemical liquid on the surface of the chemical liquid film.

2. A chemical liquid processing apparatus for processing a substrate using chemical liquid, comprising:

a substrate holding portion for holding a substrate;

a plate disposed above said substrate holding portion and having an air intake hole going through vertically;

an air flow control wall installed so as to surround said substrate holding portion and for preventing air around the substrate holding portion from being sucked; and

a rotating mechanism for rotating said plate,

wherein

the side face of said substrate holding portion has an invertedly-inclined gradient,

the top face of said air flow control wall has a gradient substantially parallel to the gradient of the side face of said substrate holding portion, and

a negative pressure is generated between the plate and the substrate held by the substrate holding portion by a rotation of said plate,

and air flow is generated between said substrate and said plate by sucking air through said air intake hole.

3. A chemical liquid processing method for processing a

substrate using chemical liquid, comprising the steps of:

supplying chemical liquid for processing a processing object film to a processing object substrate on which said processing object film is formed so as to form chemical liquid film on said processing object substrate; and

after the step for forming the chemical liquid film, forming air flow such which contacts with the chemical liquid film so as to hold said chemical liquid film on said processing object substrate and form a flow of the chemical liquid on the surface of said chemical liquid film.

4. The chemical liquid processing method according to claim 3, wherein the air flow is formed by supplying air flow formation gas from a gas supply portion dispdsed near an outer periphery of the processing object substrate to above the processing object substrate.

5. The chemical liquid processing method according to claim 4, wherein the air flow formation gas is inactive gas.

6. The chemical liquid processing method according to claim 5, wherein the air flow formation gas contains any one of ozone, oxygen and hydrogen.

7. The chemical liquid processing method according to claim 3, wherein the air flow is formed by rotating a plate disposed above the processing object substrate.

8. The chemical liquid processing method according to claim 7, wherein the shape of the plate is any one of circular, ring-like and blade-like.

9. The chemical liquid processing method according to claim 3, wherein the step for forming a flow of the chemical liquid is carried out in decarbonized environment.

10. The chemical liquid processing method according to claim 3, wherein in the step for forming a flow of the chemical liquid, the processing object substrate is rotated.

11. The chemical liquid processing method according to claim 10, wherein the processing object substrate is rotated continuously or intermittently.

12. The chemical liquid processing method according to claim 11, wherein the processing object substrate is rotated in a forward direction relative to the direction of the air flow.

13. A chemical liquid processing method for removing liquid supplied to a substrate, comprising the steps of:

holding said substrate on a horizontal substrate holding portion;

rotating a plate having an air intake hole on said substrate;

generating a negative pressure between the plate and a processing object substrate by rotating said plate; and

generating air flow between said processing object substrate and said plate by sucking air through said air intake hole in the presence of the negative pressure.

14. The chemical liquid processing method according to claim 13, wherein in the step for generating the negative pressure, said negative pressure is controlled by changing at least one of a rotation speed or acceleration of the plate and a distance between the substrate and the plate.

15. The chemical liquid processing method according to claim 14, wherein the negative pressure is controlled depending on the amount of the chemical liquid on the

substrate.

16. The chemical liquid processing method according to claim 13, wherein the diameter of an opening of the air intake hole in the center of the plate is changed during a rotation of the plate.

17. The chemical liquid processing method according to claim 13, wherein the step for rotating the plate is carried out with a gap between the plate and liquid.

18. The chemical liquid processing method according to claim 13, wherein the step for rotating the plate further comprises the steps of:

moving said plate downward from above the substrate so as to bring said plate into a contact with liquid on said substrate; and

rotating said plate in a condition that liquid is in contact with said plate.

19. The chemical liquid processing method according to claim 18, wherein in the step for bringing the liquid into contact with the plate, said plate is pressed to said liquid so as to eliminate an air gap between the substrate and said plate.

20. The chemical liquid processing method according to claim 19, wherein a liquid contacting surface of the plate is subjected to hydrophilic treatment or processing to porous state indicating an effect of air suction due to capillary phenomenon.

21. The chemical liquid processing method according to claim. 19, wherein a liquid contacting surface of the plate is subjected to water repellent treatment.

22. The chemical liquid processing method according to claim 13, wherein air flow directed from out of the substrate to the center of the substrate is killed by generating air flow directed from below the substrate holding portion to outside above said substrate holding portion on an outer peripheral portion of the substrate.

23. A chemical liquid processing method for processing a substrate using chemical liquid, comprising the steps of:

supplying chemical liquid for processing a processing object film to a processing object substrate on which said processing object film is formed so as to form chemical liquid film on said processing object substrate;

after the step for forming the chemical liquid film, forming air flow such which contacts with the chemical liquid film so as to hold said chemical liquid film on said processing object substrate and form a flow of the chemical liquid on the surface of said chemical liquid film using a plate disposed above said processing object substrate and having an air intake hole with the valve at the center; and

removing said chemical liquid supplied to a substrate, wherein the step for removing said chemical liquid supplied to a substrate further comprises the steps of:

generating a negative pressure between the plate and said processing object substrate by rotating said plate; and

generating air flow between said processing object substrate and said plate by sucking air through said air intake hole in the presence of the negative pressure.